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Examining Key Factors and Supportive Interventions Influencing Smallholder Livestock Farming Performance in Umvoti Local Municipality

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ABSTRACT

This study examined the key factors influencing agricultural performance and the supportive interventions employed by the government for smallholder livestock farmers in Umvoti Local Municipality, KwaZulu-Natal, South Africa. A mixed-methods approach was employed, involving the administration of questionnaires to 300 smallholder livestock farmers, focus group discussions, and key informant interviews. The study found that farming skillset, climate variability, and agricultural resource availability were the most critical factors affecting agricultural performance. The majority of farmers were male, had secondary education, and practised free-range grazing on communal land. Access to production inputs and markets was limited, with most farmers relying on local informal markets. Government support interventions included farmer assistance programs, veterinary services, extension services, and value-adding training, but their accessibility and effectiveness varied. The study recommends a multi-pronged approach to improve smallholder livestock farming, including increasing access to production inputs and markets, strengthening farmer support programs, and promoting sustainable agricultural practices. The findings of this study contribute to an understanding of the challenges faced by smallholder farmers and provide a foundation for designing effective support mechanisms that align with their needs and circumstances. Since the target population was smallholder farmers, the information obtained was limited and not generalisable to commercial farmers. Addressing these factors through targeted interventions, capacity building, climate adaptation strategies, and improved resource accessibility is crucial

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for enhancing the productivity and livelihoods of smallholder livestock farmers in Umvoti Local Municipality.

Keywords: Agricultural Performance, Smallholder Livestock Farmers, Interventions, Umvoti Local Municipality.

1. INTRODUCTION

The South African rural economy is largely dependent on smallholder farming for sustaining livelihoods and food security (Oluwatayo, 2019). Smallholder agriculture is the dominant sector within the broader agricultural landscape, comprising over 2 million smallholder farmers compared to approximately 35,000 commercial farmers (Carelson *et al*., 2021). This sector has been a longstanding practice in South Africa (SA), particularly among rural households (Hlatshwayo *et al*., 2021). The 2022 census report revealed that KwaZulu-Natal and the Eastern Cape provinces accounted for the same proportion of smallholder livestock farming, at 25.8%, compared to other provinces (Stats SA, 2022). This highlights the importance of smallholder farming in national agricultural production and food security, particularly in resource-limited settings where it is often the primary source of sustenance and income (Hazell, 2020).

The South African government has implemented several initiatives to recognise the significance of smallholder agriculture (Carelson *et al*., 2021). These include infrastructure development, input subsidies, and agricultural extension services provided by the government (Zantsi *et al*., 2021). Local programs focused on market access, resource pooling, and knowledge sharing are examples of community initiatives that also have an impact (Kaponda & Chiwaridzo, 2024). Although the goals of these programs are to increase farmers' knowledge, lower production costs, and open up markets, those efficacies vary, calling for more focused and situation-specific strategies (Sango, 2022). This variance has exposed the smallholder livestock farmers in the Umvoti local municipality to a continuous build-up of challenges that discourage their agricultural performance. Therefore, this study aims to examine the key factors influencing the agricultural performance of smallholder livestock farmers in Umvoti Local Municipality and identify supportive interventions that can enhance their productivity, profitability, and overall well-being.

The objectives of this study are to identify key factors influencing the agricultural performance of smallholder livestock farmers and to explore the strategies and interventions employed to

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support their productivity. This evidence can inform the implementation of development programs and investment strategies that can effectively address the needs of smallholder farmers and promote sustainable agricultural development. Without a clear understanding of the challenges faced by smallholder farmers in this study area, they may miss growth opportunities, and the effectiveness of existing support mechanisms and interventions may be compromised, resulting in misdirected or ineffective efforts that waste valuable resources.

2. THEORETICAL FRAMEWORK

The theoretical framework underpinning this study is grounded in the Sustainable Livelihoods Framework (SLF), which provides a comprehensive lens for analysing the multifaceted factors influencing the agricultural performance of smallholder farmers and the efficacy of interventions designed to support them (Natarajan *et al*., 2022). This framework is complemented by aspects of the Diffusion of Innovations Theory (DOI), which explains the adoption and impact of agricultural interventions (Anon., 2018). Together, these theories offer a robust foundation for addressing the study's aim of contributing evidence-based insights to guide smallholder farmer development and enhance food security in the Umvoti Local Municipality.

2.1. Sustainable Livelihoods Framework (SLF)

The SLF, developed by the Department for International Development (DFID), offers a comprehensive approach to understanding rural livelihoods by examining the interplay between five core asset categories: human, natural, financial, physical, and social capital (Natarajan *et al*., 2022). These assets form the foundation of smallholder farmers’ livelihoods and determine their capacity to engage in productive agricultural practices (Seetha, 2024).

For this study, the SLF serves as a lens to address the first specific objective: to determine the factors affecting the agricultural performance of smallholder livestock farmers in Umvoti Local Municipality. The key elements of the SLF that are particularly relevant include human capital, natural capital, financial capital, physical capital, and social capital (Seetha, 2024). Analysing these dimensions provides insights into the constraints and opportunities faced by smallholder farmers in their agricultural performance (Natarajan *et al*., 2022). This framework also highlights the vulnerabilities posed by external shocks, such as climate change or market fluctuations, and how these influence livelihood strategies (Natarajan *et al*., 2022).

2.2. Diffusion of Innovations Theory (DOI)

The DOI, proposed by Everett Rogers, focuses on how new ideas, practices, or technologies are communicated and adopted within a social system (García-Avilés, 2023). This theory is particularly relevant to the second specific objective: to explore the interventions employed by various stakeholders, including the Department of Agriculture and Rural Development, local municipalities, and other government entities, that support smallholder farmers in Umvoti Local Municipality, with the aim of enhancing the agricultural performance of smallholder livestock farmers.

According to the DOI, the adoption of innovations follows a process influenced by several factors:

(i) **Relative Advantage**: The perceived benefits of an intervention compared to existing practices (El Malouf & Bahemia, 2023). For instance, farmers are more likely to adopt interventions that clearly enhance livestock productivity or reduce costs (Rizzo *et al.*, 2024).

(ii) **Compatibility**: The alignment of the intervention with farmers' existing values, experiences, and needs (El Malouf & Bahemia, 2023). Interventions that are culturally and contextually appropriate are more likely to be adopted (Marsiglia & Booth, 2015).

(iii) **Complexity**: The ease or difficulty of understanding and implementing the intervention (El Malouf & Bahemia, 2023). Simpler and more user-friendly solutions tend to be adopted more readily.

(iv) **Trialability**: The ability to experiment with the intervention on a small scale before full adoption (El Malouf & Bahemia, 2023). Pilot programs or demonstrations can build confidence among farmers (Alexopoulos *et al.*, 2021).

(v) **Observability**: The visibility of positive outcomes from the intervention (El Malouf & Bahemia, 2023). Successful case studies or peer testimonies can encourage widespread adoption (Alexopoulos *et al.*, 2021).

By applying the DOI, this study will evaluate the design, delivery, and effectiveness of agricultural support interventions, including extension services, training programs, and access

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to financial or technical resources. The theory will also shed light on barriers to adoption and how these can be addressed to improve the uptake and sustainability of interventions.

2.3. Integration of Theories

The integration of the SLF and DOI provides a synergistic framework for this study. While the SLF emphasises the resources and contextual factors that influence agricultural performance, the DOI focuses on the process and dynamics of intervention adoption (Natarajan *et al*., 2022; El Malouf & Bahemia, 2023). Together, these frameworks enable a comprehensive analysis of both the internal and external factors shaping smallholder farming outcomes (Khan *et al*., 2022). This theoretical foundation supports the study's aim of contributing evidence-based insights for targeted interventions and inclusive rural development. By linking the determinants of agricultural performance with the mechanisms of effective intervention implementation, the study will offer actionable recommendations to enhance food security and the livelihoods of smallholder livestock farmers in Umvoti Local Municipality.

3. EMPIRICAL LITERATURE REVIEW

This study empirically investigated the key factors influencing agricultural performance and the effectiveness of supportive interventions for smallholder livestock farmers in South Africa. Utilising a mixed-methods approach with data from smallholder farmers, focus groups, and key informant interviews, the farming skillset, climate variability, and agricultural resource availability are critical determinants of their performance (Oluwatayo, 2019). Furthermore, most farmers are males who primarily practice free-range grazing on communal land, with significant limitations in accessing production inputs and broader markets (Barajas *et al*., 2024). While government interventions, including farmer assistance, veterinary services, and extension services, along with value-adding training, are in place, their accessibility and efficacy have been found to be inconsistent (Amaglobeli *et al*., 2024). Therefore, the recommendations include a multi-pronged approach to enhance smallholder livestock farming through improved access to inputs and markets, strengthened support programs, and the promotion of sustainable practices (Cheteni & Mokhele, 2019).

4. MATERIALS AND METHODS

4.1. Study Site

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The study site, Umvoti Local Municipality, is situated in the KwaZulu-Natal province of South Africa and is administratively identified as KZN245 (Umvoti Municipality, 2020). The municipality consists of 14 wards, as illustrated in Figure 1; hence, this study targeted all the wards. However, areas such as Ntunjambili and Kranskop, located in Ward 5 (Figure 1), have portions that fall under Umvoti Local Municipality, and other portions fall under Ilembe District (Umvoti Municipality, 2020). All 14 wards participated, with 22 participants from wards 1, 6, 8, 11, and 12, and 14 participants from wards 2, 3, 4, 5, 7, 9, 10, and 13. There were 21 participants in total. The municipality spans both urban and rural areas, providing a diverse backdrop for understanding agricultural practices and interventions (Umvoti Municipality, 2020). As a region with significant agricultural potential, offering opportunities for growth and improvement in local food security, it serves as a critical case study for exploring the determinants of smallholder agricultural performance and the effectiveness of targeted interventions (Umvoti Municipality, 2020). Umvoti is characterised by a mix of urban hubs, such as Greytown, and vast rural areas that support a predominantly agrarian population (Umvoti Municipality, 2020). Its geography includes fertile valleys and rolling hills, which are integral to the agricultural livelihoods of its residents (Umvoti Municipality, 2020). Livestock farming, a cornerstone of agricultural activity in the municipality, plays a vital role in local food systems and economic sustainability by providing household income (Umvoti Municipality, 2020).

The municipality has identified Local Economic Development (LED) as a priority, with a particular emphasis on enhancing agricultural performance to address food security and promote rural development (Umvoti Local Municipality, 2023). The rural population, largely dependent on smallholder farming, faces challenges such as limited access to infrastructure, markets and extension services (Umvoti Local Municipality, 2023). The socioeconomic profile of Umvoti reflects high levels of unemployment and poverty, particularly in rural areas, where smallholder farmers often lack the resources and knowledge to improve agricultural productivity (Stats SA, 2022). The choice of Umvoti Local Municipality as the study site aligns with the overarching aim of contributing evidence-based insights to enhance local food security and promote inclusive rural development. The findings from this site can serve as a model for other municipalities facing similar socioeconomic and agricultural challenges.

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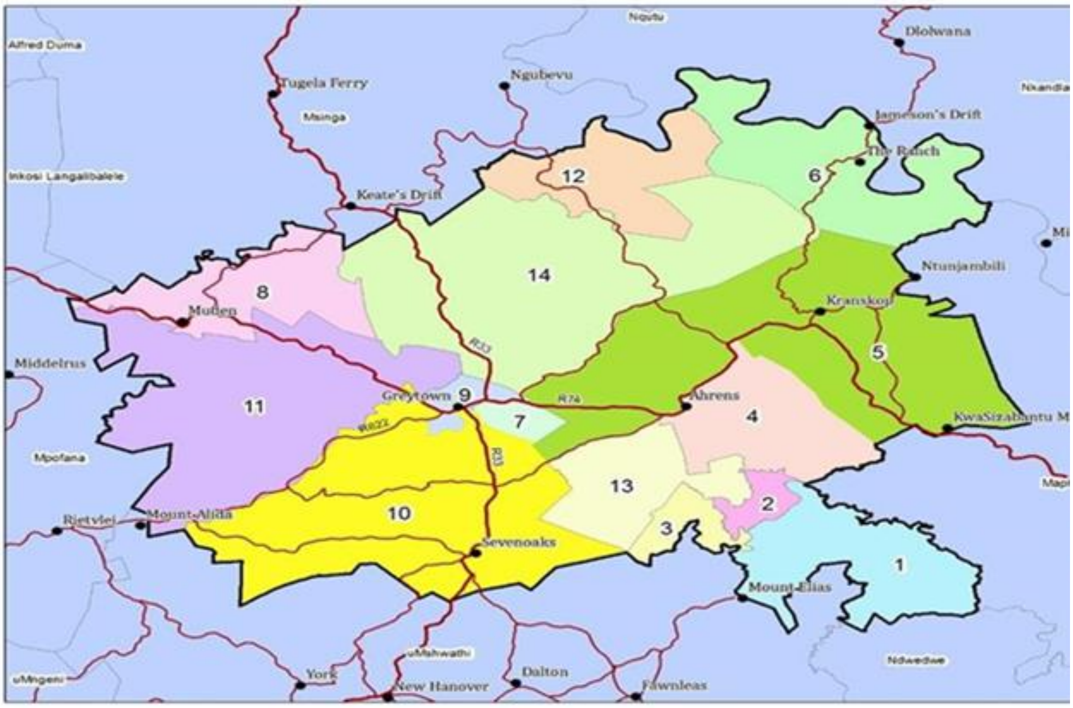

FIGURE 1: The Map of the Umvoti Local Municipality (Source: Umvoti Municipality, 2020).

4.2. Research Design

This research employed a mixed-methods design to examine the key factors influencing agricultural performance and explore the supportive interventions for smallholder livestock farmers in Umvoti Local Municipality. This approach enabled a comprehensive understanding of the complex dynamics at play by integrating both qualitative and quantitative data, thereby mitigating the potential biases inherent in either quantitative or qualitative approaches individually (Susanto *et al*., 2024).

For objective 1, which looked at key factors affecting the agricultural performance of smallholder livestock farmers, the quantitative methods, specifically the descriptive statistical analysis of questionnaires, were ideal for identifying and measuring the key factors influencing the performance across the sample of 300 smallholder livestock farmers in Umvoti local municipality (Susanto *et al*., 2024). The qualitative methods, including thematic analysis of focus group discussions and key informant interviews, were also employed to ensure that the research findings are grounded in the realities of smallholder livestock farmers in Umvoti Local Municipality (Tenny *et al*., 2022).

For objective 2, which looked at the supportive interventions employed by the government to support smallholder livestock farmers in Umvoti local municipality, the qualitative methods, such as the thematic analysis of the key informant interviews and focus group discussions, were used to obtain insights into the experiences, challenges, and needs related to existing and potential support interventions (Susanto *et al*., 2024).

4.3. Study Population Sampling Procedure

The study focused on smallholder livestock farmers residing in the rural areas of Umvoti Local Municipality, KwaZulu-Natal, South Africa. This population is characterised by significant socioeconomic, geographic, and demographic diversity, providing valuable insights into the factors that influence agricultural performance and food security (Umvoti Municipality, 2020). The socioeconomic profile of the study population reveals high levels of unemployment and poverty, with farmers primarily relying on livestock farming, particularly cattle, goats, and poultry for household consumption and income generation (Umvoti Local Municipality, 2024). Geographically, farmers are distributed across the municipality’s rural expanse, with many residing in remote areas lacking adequate infrastructure, such as roads, electrification, and water access (Umvoti Local Municipality, 2023). These disparities influence farming practices and restrict access to essential support services (Touch *et al*., 2024).

A simple random sampling technique was used to select 300 smallholder livestock farmers from a population of 1,800. This information was obtained from the database of smallholder livestock farmers maintained by the Department of Agriculture and Rural Development's Umvoti local office. The target population of smallholder livestock farmers encompasses both small stock, including goats, sheep, and pigs, as well as large stock, such as cattle and poultry. The simple random sampling technique ensured that every farmer had an equal chance of being included in the study, thereby minimising selection bias and enhancing the generalizability of the findings to the broader population (Noor *et al*., 2022). The sample size of 300 was deemed appropriate based on Cochran's formula (Noor *et al*., 2022). This formula suggested that for a population of 1800, a sample size of 300 achieves a 95% confidence level with a 5% margin of error, ensuring the representativeness of the sample and the generalisability of the findings to the broader population of smallholder livestock farmers in the Umvoti local office (Sugden, 2000).

4.4. Data Collection

Data collection employed a mixed-methods approach. Initially, quantitative data were obtained through a structured questionnaire administered to a sample of 300 participants. The data were collected in 2024 over a three-month period, from August to October. This provided a preliminary understanding of the smallholder livestock farmers within the Umvoti local municipality. Subsequently, a purposive sampling technique was utilised to select participants for qualitative data collection through focus group discussions (Stratton, 2024). Each focus group, consisting of 8-10 participants, facilitated an in-depth exploration of farmers' experiences, knowledge, and challenges related to agricultural production. A total of 33 focus group discussions were conducted, with 2 to 3 per ward. For wards close to one another, the third focus group discussion included a portion of participants from each ward to meet the limit of 8 to 10 participants.

To complement the focus group findings and provide a multifaceted perspective, semi-structured interviews were conducted with key informants involved in service provision to smallholder livestock farmers (DeJonckheere & Vaughn, 2019). This triangulation of data sources, incorporating both farmer and stakeholder perspectives, enabled a more robust analysis of the factors influencing agricultural performance (Susanto *et al*., 2024). Furthermore, the focus group discussions, moderated by a neutral facilitator, were designed to foster open communication and active participation (DeJonckheere & Vaughn, 2019).

4.5. Data Analysis

Objective 1, focused on identifying key factors influencing the agricultural performance of smallholder livestock farmers in Umvoti Local Municipality, was addressed through mixed-methods analysis. Quantitative data from questionnaires were analysed using descriptive and inferential statistics via SPSS to summarise trends and identify significant relationships (Ali, 2021). Techniques such as correlation analysis, regression analysis, and t-tests were employed to investigate the impact of factors like resource access, market access, and farmer demographics on agricultural performance (Smith, 2015). Qualitative data from interviews and focus group discussions underwent thematic analysis to uncover patterns and themes, providing deeper insights into these influencing factors (Sovacool *et al.*, 2023). This integration of methods enabled a comprehensive investigation of agricultural performance (Smith, 2015).

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For Objective 2, which explored strategies and interventions supporting farmer productivity, qualitative methods were employed. Data collection involved in-depth interviews with key informants and focus group discussions with smallholder farmers, capturing nuanced perspectives on available support systems (Susanto *et al*., 2024). The qualitative data, analysed using NVivo software, underwent systematic coding and thematic analysis. Recurring concepts were identified, organised, and grouped into themes, thereby enhancing the rigour and transparency of the findings (Bazeley, 2007). This process ensured the results reflected participants' experiences and insights into farmer support strategies (Bazeley, 2007).

5. RESULTS AND DISCUSSIONS

5.1. Socioeconomic Demographics of Participants

5.1.1. Gender Distribution

The gender distribution in Table 1 indicates a predominance of male smallholder livestock farmers, with males constituting 73.3% and females making up the minimum of 26.7%. This disparity suggests, like many other regions around the world, that males within the Umvoti local municipality are more engaged in agricultural activities (Medagbe *et al*., 2020). Elias *et al*. (2024) found that this is because women are often invisible in decision-making processes, lacking control over livestock assets and land. These findings also align with Maziya *et al*. (2020), who concluded that although poverty is common among smallholder livestock farmers in South Africa, it is more pronounced in households headed by women. While Aboah *et al*. (2024) found that male dominance in livestock production is greater than female due to the physically demanding nature of livestock handling activities. Understanding gender roles is therefore essential in developing targeted interventions that enhance productivity and ensure equitable access to resources (Medagbe *et al*., 2020).

5.1.2. Educational Level

Education levels among the smallholder livestock farmers varied, with the majority having completed secondary school (30.7%) or primary school (17.0%). A notable proportion (11.0%) had attained higher education, while a small fraction (9.7%) lacked formal education. Similarly, Bese *et al*. (2021) also reported low education levels among smallholder farmers in the Eastern Cape, South Africa. Mwamfupe (2019) and Hlalele (2014) explained that this is due to the limited opportunities for higher education in rural areas, where smallholder farmers reside, resulting in a low proportion of farmers with higher education. Education is a critical

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factor in adopting modern farming techniques and improving productivity (Touch *et al*., 2024). Therefore, initiatives aimed at enhancing educational opportunities in rural areas could have a significant impact on agricultural performance and, subsequently, household food security (Touch *et al*., 2024).

5.1.3. Age Distribution of Farmers

Table 1 reveals a significant age gap in the farming community, with senior farmers constituting the largest proportion at 60%. Middle-aged farmers accounted for 31.7%, while young farmers represented only 8.3%. According to Touch *et al*. (2024), this could be due to the rural-urban migration of youth in search of employment and educational opportunities, leaving elders behind. Dokubo *et al*. (2023) concluded that this trend could have implications for the future of agriculture, as the knowledge and experience of senior farmers may not be adequately transferred to younger generations. Additionally, the ageing farmer population may pose challenges in terms of labour availability and the long-term sustainability of the farm (Tong *et al*., 2024).

5.1.4. Land Ownership

The data reveals that a significant majority (75.3%) of respondents do not own land they use for farming, while only 24.7% have land ownership. This lack of land ownership among most smallholder livestock farmers could be a major constraint to their agricultural performance, as land ownership often determines the ability to invest in and improve agricultural productivity (Mdoda & Gidi, 2023). According to Pravalie *et al*. (2021) and several other reports, Africa accounts for over 60% of the world's available arable land; however, smallholder farmers in Africa often struggle to secure sufficient and suitable land to grow crops and raise livestock. Boss and Meinzen-Dick (2020) reported that this is due to the predominant land tenure arrangements, where land was collectively held by families; hence, no form of security was provided to users, especially women and youth. For example, in most regions of Africa, only a small fraction of land rights, which is limited to 1-2%, is held by women, and this also depends on the marital status of a woman (Boss & Meinzen-Dick, 2020).

5.1.5. Type of Land Ownership

The findings revealed that the majority (67%) use communal land, followed by freehold (23.3%), PTO (8.3%), and lease (1.3%). According to Rootman *et al*. (2015), this is due to the

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legacy of apartheid, low livestock sales, and the potential of smallholder livestock systems for rural development in South Africa. Communal land ownership, therefore, has implications for agricultural productivity, as it may restrict individual investment and innovation due to shared rights and responsibilities (Barajas *et al*., 2024). The allocation of communally owned land is only done by the traditional authority. Conversely, freehold and leasehold types provide more security and incentives for investment (Timmins *et al*., 2022). The dominance of communal land ownership suggested that collective approaches and community-based interventions could be more effective in enhancing agricultural performance.

5.1.6. Livestock Management Practices

The majority of farmers (74.7%) used free-range grazing, which allows livestock to roam freely on natural pastures, due to lower input costs and a reliance on natural resources. Intensive farming, which involves controlled environments with supplementary feeding, is practised by 20.7% of farmers. Pasture-based and stall-fed systems were less common, accounting for 1.7% and 3%, respectively. Due to several factors such as limited financial resources and lack of livestock production expertise, the majority of smallholder farmers from the rural areas practise free-range grazing because it requires less capital investment and livestock can forage for natural feed, eliminating the need for expensive supplements (Nkonki *et al*., 2018; Mbatha, 2021). However, these farmers are often limited in accessing high-quality forage, which then reduces their ability to compete in mainstream beef markets, resulting in low farm income (Nyambali *et al*., 2022).

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TABLE 1: **Socio-Demographic Characteristics of Smallholder Livestock Farmers in Umvoti Local**

Variable	Frequency	Percent
Gender		
Male	220	73.3
Female	80	26.7
Educational Level		
No formal education	29	9.7
Primary school	51	17.0
Secondary school	92	30.7
Vocational training	95	3.7
Higher education	33	11.0
Age Distribution		
Young farmer	25	8.3
Middle-aged farmer	95	31.7
Senior farmer	180	60
Years of Experience		
Beginner	7	2.3
Intermediate	92	30.7
Advanced	201	67
Land Ownership		
Yes	74	24.7
No	26	75.3
Type of Land Ownership		
Freehold	70	23.3
Communal	201	67
PTO	25	8.3
Lease	4	1.3
Livestock Management Practices		
Pasture Based	5	1.7
Stall-Fed	9	3.0
Free Range	224	74.7
Intensive Farming	62	20.7
Access to Production Inputs		
Easily Accessible	16	5.3
Moderately Accessible	103	34.3
Not Accessible	181	60.3
Ease of Access to Financial Resources		
Easy	4	1.3
Moderate	34	11.3
Difficult	262	87.3
Source of Water for Farming		
Rainfed	80	26.7
River/ Stream	185	61.7
Borehole/well	12	4.0
Other	23	7.7
Market Access		
Local Market	295	98.3
Regional market	5	1.7
Total	300	100

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TABLE 2: Types of Livestock Raised by Smallholder Livestock Farmers in Umvoti Local

Variable	Frequency	Percent
Type of Livestock		
Cattle and goat	183	61
Sheep and goat	31	10
piggery	20	7
poultry	66	22
Total	300	100

5.1.7. Access to Production Inputs

The data revealed a significant challenge faced by smallholder livestock farmers in accessing essential production inputs. Over 60% of farmers reported that these inputs are not accessible to them, while only a small fraction (5.3%) had easy access to them. According to Nyambali *et al*. (2022), De Almeida *et al*. (2021), and several other studies, the lack of access to crucial inputs, such as feed, veterinary medicines, and breeding stock, may severely hinder productivity and profitability for smallholder livestock farmers. Sithirith *et al*. (2024) found that in Cambodia, the inaccessibility of production inputs is due to a lack of purchasing power, and the high costs of production inputs are one of the key factors that trap smallholder farmers' households in a cycle of debt, leaving them food insecure. This suggests the need for improved supportive policies to enhance the availability and affordability of these inputs for smallholder farmers (De Almeida *et al*., 2021).

5.1.8. Source of Water for Farming

The data revealed that the primary source of water for smallholder livestock farmers in the Umvoti local municipality is rivers and streams, accounting for 61.7% of respondents. The reliance on surface water sources can make these farmers vulnerable to seasonal variations in water availability, particularly during dry periods (Piemontese *et al*., 2024). Hawkins *et al*. (2022) found that resource-poor farmers, whose feed availability relies on rain, are mostly those who struggle to purchase supplements during the dry season. As a result, they are most likely to struggle to manage the herd effectively during the dry season, which reduces the reproductive capacity of livestock (Piemontese *et al*., 2024).

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5.1.9. Market Access

The study suggested that the vast majority (98.3%) of smallholder livestock farmers primarily rely on local markets to sell their livestock and livestock products. This suggests that their operations are largely localised and may face limitations in accessing wider markets and potentially higher prices (Mbatha, 2021). While some farmers (1.7%) do sell to regional markets, this suggests a limited capacity to expand their market reach and diversify their income sources. This reliance on local markets could make these farmers vulnerable to price fluctuations, changes in local demand, and limited market information (Touch *et al*., 2024). Balehegn *et al*. (2021) found that marketing is one of the issues most seriously impeding livestock development in Africa. According to Cheteni & Mokhele (2019), smallholder farmers continue to participate in livestock markets due to the remoteness of livestock producers from main urban market centres and poor road infrastructure, which results in high transport costs.

5.1.10. Type of Livestock

Based on Table 2, the dominant livestock combination is "Cattle and goat," representing 61% of farmers, suggesting a strong preference for these animals, likely due to their economic importance for sales and cultural value. Poultry is the second most common, at 22%, indicating its role in providing income and food security, likely due to its quicker turnover, as they take about 5 weeks to be ready for sale. Conversely, "Sheep and goat" (10%) and "piggery" (7%) are less prevalent, possibly due to factors such as specific environmental requirements, market demand, or higher initial investment/management complexities (Hawkins *et al*., 2022). These distributions highlight a focus on cattle and goats, suggesting that factors such as access to grazing land, water resources, and markets for these specific livestock types are crucial for the overall agricultural performance of smallholder farmers in the Umvoti local municipality (Touch *et al*., 2024).

5.2. Factors Affecting Smallholder Farmers' Agricultural Performance

The thematic analysis identified three key factors influencing the agricultural performance of smallholder livestock farmers in the Umvoti Local Municipality: farming skillset, climate variability, and access to agricultural resources (Figure 2). These factors, interlinked and multifaceted, contribute significantly to shaping productivity and livelihoods in this context.

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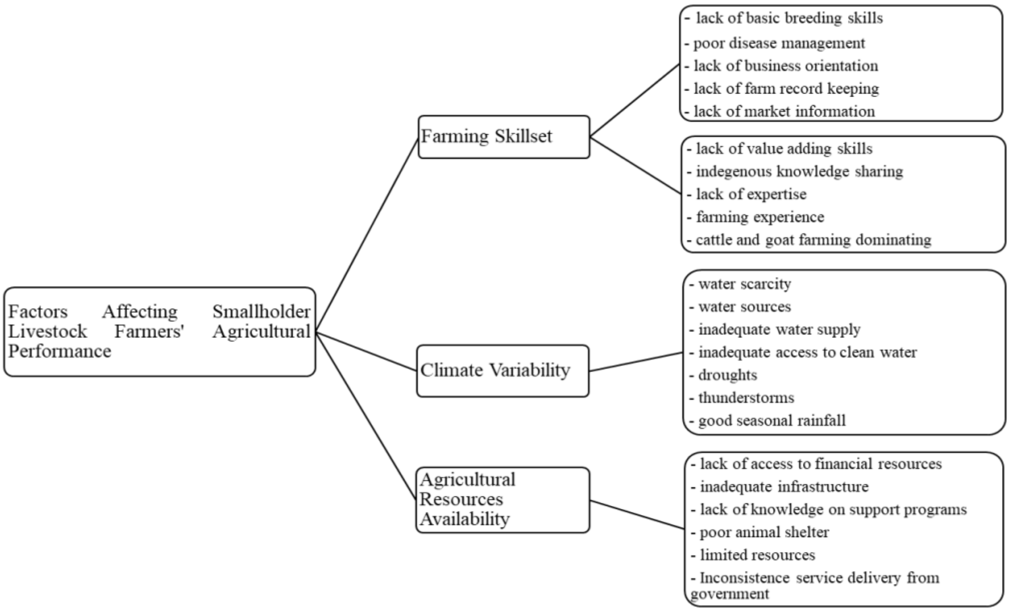

FIGURE 2: **The Key Themes Highlighting Factors Affecting Smallholder Farmers' Agricultural Performance in Umvoti Local Municipality**

5.2.1. Farming Skillset

A critical challenge for smallholder livestock farmers in Umvoti is the lack of essential farming skills, which impedes productivity and the ability to adapt to changing agricultural demands. Deficiencies in basic breeding skills, disease management, and farm record-keeping were evident, alongside a lack of business orientation and market information. These gaps limit farmers' ability to enhance livestock health, optimise production processes, and engage effectively with markets (Bese *et al*., 2021). Additionally, the dominance of cattle and goat farming, which is often reliant on indigenous knowledge and traditional practices, highlights a need for modernised value-adding skills and technical expertise. These findings align with previous studies that emphasise the importance of capacity building and education in enhancing agricultural performance among smallholder farmers (Jones *et al*., 2020).

5.2.2. Climate Variability

Climate variability emerged as a significant factor affecting agricultural performance. Farmers reported challenges related to water scarcity, inadequate water supply infrastructure, and limited access to clean water. Recurring droughts, thunderstorms, and other climatic events exacerbate these issues, disrupting farming operations and livestock productivity. However, respondents also noted instances of favourable seasonal rainfall, which underscores the complex and inconsistent impacts of climate on agriculture. Such findings are consistent with broader research, which highlights the vulnerability of smallholder farmers to climate variability and underscores the need for adaptive strategies (Zenda *et al*., 2024). Effective water resource management and climate-resilient practices are crucial for mitigating these challenges and ensuring sustainable agricultural production (Zenda *et al*., 2024).

5.2.3. Agricultural Resource Availability

The availability and accessibility of agricultural resources represent another crucial determinant of performance. Farmers reported inadequate infrastructure, including poor roads and animal shelters, limited financial resources, and a lack of knowledge regarding government support programs. Furthermore, inconsistencies in service delivery by government institutions were highlighted, which often undermined the effectiveness of agricultural interventions. These constraints align with studies that emphasise the importance of access to resources and institutional support in enhancing smallholder agricultural outcomes (Susanto *et al*., 2024). Addressing these barriers through improved infrastructure, financial support, and streamlined extension services is critical to empowering farmers and boosting productivity (Susanto *et al*., 2024). The findings underscore the interplay of farming skill sets, climate variability, and resource availability in shaping the agricultural performance of smallholder livestock farmers in Umvoti. Addressing these factors through targeted interventions, including capacity building, climate adaptation strategies, and improved access to resources, is crucial for enhancing productivity and livelihoods (Myeni & Moeletsi, 2020).

5.3. Support Interventions

Figure 3 illustrates the key government support interventions that emerged from the focus group discussions and key informant interviews. The interventions that were discussed encompassed broader support networks beyond disease management. The thematic analysis identified several government support interventions aimed at enhancing the productivity and resilience of smallholder livestock farmers in the Umvoti Local Municipality. These strategies encompass veterinary services, disease management training, farmer support programmes, and value-adding initiatives, among others. Their effectiveness in addressing key challenges faced by smallholder farmers offers insights into potential improvements for targeted support (Myeni & Moeletsi, 2020).

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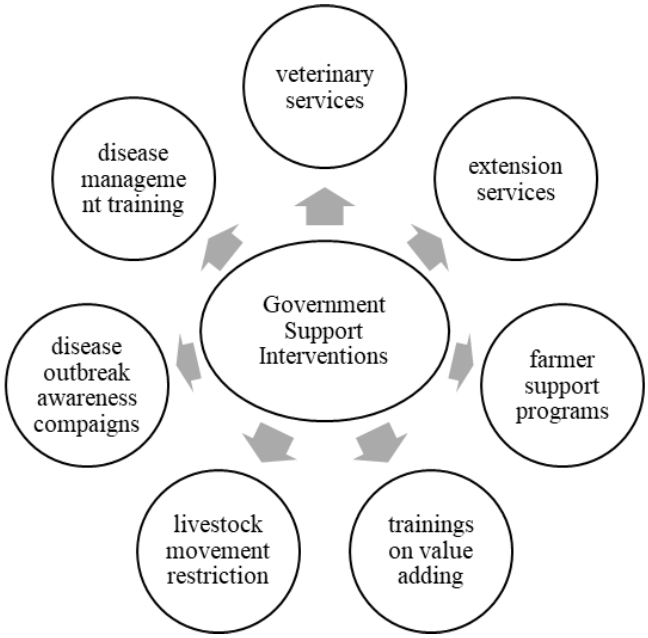

FIGURE 3: **The Government Support Interventions for Smallholder Livestock Farmers in Umvoti**

5.3.1. Veterinary Services and Disease Management

Veterinary services emerged as a cornerstone of government interventions, offering critical support for livestock health. These services are complemented by disease management training and awareness campaigns designed to equip farmers with the knowledge to identify, prevent, and address livestock diseases. Disease outbreaks can devastate smallholder livelihoods by reducing livestock productivity and increasing mortality rates (Zawadi, 2024). The integration of awareness campaigns with veterinary services promotes a proactive approach, enabling farmers to effectively mitigate risks (Maina *et al.*, 2023). These findings align with the literature that emphasises the role of veterinary interventions in improving livestock health and safeguarding food security (Sarma, 2024).

5.3.2. Extension Services and Farmer Support Programmes

Extension services offer farmers access to technical expertise and practical knowledge, thereby facilitating the adoption of improved farming practices (Raji, 2024). These services bridge the gap between smallholder farmers and innovation, enabling them to enhance productivity through modernised techniques (Raji, 2024). Similarly, farmer support programs provide a structured framework for accessing resources, including subsidised inputs and financial assistance (Amaglobeli *et al*., 2024). However, the effectiveness of these programs often hinges on consistent delivery and accessibility, with respondents highlighting occasional gaps in service provision. Studies have consistently shown that extension services play a pivotal role in supporting smallholders by addressing technical constraints and fostering sustainable agricultural practices (Moyo & Salawu, 2018).

5.3.3. Value-Adding Initiatives and Capacity Building

Training on value addition represents a significant effort to enhance the economic viability of smallholder farming (Tselaesele *et al*., 2018). These initiatives aim to equip farmers with skills to diversify their income streams through the processing, branding, and marketing of livestock products (Tselaesele *et al*., 2018). Such interventions empower farmers to move beyond smallholder farming and engage with broader markets, thereby improving profitability (Malembe, 2021). Capacity-building initiatives also include workshops designed to enhance technical expertise and business acumen, ensuring that farmers are equipped to navigate complex agricultural systems (Tselaesele *et al*., 2018). Previous research has underscored the importance of value addition in strengthening rural economies and improving farmer resilience (Malembe, 2021).

5.3.4. Regulatory Measures for Disease Control

Livestock movement restrictions are implemented as a regulatory measure to curb the spread of diseases (Tildesley *et al*., 2019). While these restrictions are crucial during outbreaks, they can also inadvertently limit market access, posing challenges for smallholder farmers who rely on livestock sales (Knight-Jones *et al*., 2017). Balancing disease control with market access remains a critical consideration for policymakers and practitioners (Knight-Jones *et al*., 2017). Effective implementation of such measures requires collaboration between government agencies and farmers to ensure compliance without compromising livelihoods (Tildesley *et al*., 2019).

5.3.5. Challenges and Opportunities in Intervention Delivery

The thematic analysis revealed inconsistencies in the delivery and accessibility of government interventions. While many programs are well-intentioned, their impact is often diluted by logistical challenges, limited outreach, and inadequate follow-up mechanisms (Touch *et al*., 2024). Enhancing the efficiency of intervention delivery requires addressing systemic barriers

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and fostering participatory approaches that incorporate farmer feedback (Touch *et al*., 2024). Research emphasises that inclusive and context-specific interventions are more likely to yield sustainable outcomes for smallholder farmers (Nyoni *et al*., 2024).

The analysis highlights the multifaceted nature of government support interventions in addressing the challenges faced by smallholder livestock farmers. While veterinary services, capacity-building initiatives, and regulatory measures contribute positively, gaps in service delivery underscore the need for enhanced coordination and outreach (Maposa, et al., 2023). By refining these interventions and ensuring their alignment with the needs of farmers, policymakers can significantly enhance the productivity, resilience, and sustainability of smallholder farming systems (Maposa *et al*., 2023). This discussion contributes to a deeper understanding of the interplay between support mechanisms and smallholder agricultural performance, providing a foundation for evidence-based policy recommendations.

6. CONCLUSION AND RECOMMENDATIONS

This study examined the key factors influencing agricultural performance and supportive interventions for smallholder livestock farmers in the Umvoti Local Municipality, KwaZulu-Natal, South Africa. The study employed a mixed-methods approach, collecting data from 300 smallholder livestock farmers through questionnaires, focus group discussions, and key informant interviews. The findings revealed that farming skillset, climate variability, and agricultural resource availability were the most important factors affecting agricultural performance. The majority of farmers were men, had a secondary education, and practised free-range grazing on communal land. Access to production inputs and markets was limited, with most farmers relying on local markets. Government support interventions included farmer assistance programs, veterinary services, extension services, and value-added training, but their access and effectiveness varied. The study recommended a multi-pronged approach to improve smallholder livestock farming, including increasing access to production inputs and markets, strengthening farmer support programs, and promoting sustainable agricultural practices.

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This study received no external funding.

9. DATA AVAILABILITY STATEMENT

The corresponding author will provide the datasets used and/or analysed upon reasonable request.

10. DECLARATION

The authors declared that they have no conflict of interest.

11. AUTHOR CONTRIBUTIONS

Data collection, analysis, and discussion of the empirical results for the above-listed publication manuscript were conducted in their entirety by S.A.M. with the advice and guidance of K.D.N. All tables and figures were produced by S.A.M. unless otherwise referenced in the respective sections and publications.

12. APPROVAL STATEMENT/ETHICS STATEMENT

This study was approved by the Humanities and Social Sciences Research Ethics Committee (HSSREC); the protocol reference number is HSSREC/00007202/2024. All participants provided informed consent before participating in the study.

13. INFORMED CONSENT STATEMENT

Participants were informed about the purpose of the study through the written consent form, which outlined their rights to withdraw from the study at any time and the confidentiality of their responses. They were also informed about the potential risks and benefits of participating in the study, and therefore, they signed the form to give their consent.

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